

## **REMARKS/ARGUMENTS**

Claims 1-65, 78, 80, 82, 84, 86, 88, 90 and 92-96 are pending in this application. Of these pending claims, nos. 1-4, 6-9, 13-22, 24-26, 29-31, 35-46 and 90 are examined and have been rejected, whereas claims 5, 10-12, 23, 27, 28, 32-34, 47-65, 78, 80, 82, 84, 86, 88 and 92-96 are withdrawn by the Examiner from consideration.

Claims 1, 3, 7, 15 and 36 have been amended to more clearly recite applicants' invention. The claim amendments are all entirely supported by the application as originally filed and, therefore, they raise no issue of new matter. Entry of the claim amendments is, therefore, respectfully requested.

### **Claim Rejections Under 35 U.S.C. §112**

Claims 3, 7, 15 and 36 are rejected under 35 U.S.C. §112, second paragraph, for the reasons set forth at pps. 2-3 of the Office Action. These rejections are respectfully traversed.

In light of the claim rejections under §112 noted above, applicants have amended claims 3, 7, 15 and 36 in a manner which is believed to overcome the grounds upon which the rejections are based. The Examiner is, therefore, respectfully requested to reconsider and withdraw the rejections.

### **Claim Rejections Under 35 U.S.C. §102**

Claims 1-4, 6, 7, 13-17, 19-22, 24-26, 29-31, 35-46 and 90 are rejected under 35 U.S.C. §102(e) as allegedly being anticipated by Mirkin et al. (US 2002/0127574), hereinafter "Mirkin" for the reasons given at pps. 3-5 of the Office Action. These rejections are respectfully traversed.

The Examiner, referring specifically to Fig. 13B of Mirkin, indicates at pps. 2-3 of the Office Action that the subject reference teaches an element comprising a carrier with a surface, having at least one microstructure on the carrier surface. The microstructure consists of individual components in the form of nanoparticles, which have molecule-specific detection sites with one or more first functional groups. Biologically functioning or active molecules can be bound to the first functional groups in a directional manner, thus making possible the addressability of the microstructure. Between the surface of the carrier and the microstructure

there is located at least one layer of a bonding agent that is a self-assembled monolayer ("SAM") based on a thiol to assure permanent adherence of the nanoparticles.

In response to the above-noted rejection, applicants have amended claim 1 to clarify the recitation of their invention wherein the subject claim now states that, "where, between the surface of the carrier and the microstructure, at least one layer of a bonding agent, selected from a charged polymer or a plasma layer with charged chemically reactive groups is provided." (emphasis supplied). Thus, according to claim 1 the bonding agent must be either: (a) a charged polymer, or (2) a plasma layer with charged chemically reactive groups.

In contrast, as noted above the Mirkin reference teaches to use a bonding agent that is a self assembled monolayer based on a thiol. As shown, for example, in the attached copy of Xia *et al.*, Agnew Chem. Int. Ed. (1998), 37: pp. 550-575 self-assembled monolayers, produced as taught in the Mirkin reference, *always* form regular or highly ordered structures (see, e.g., Fig. 4 at p. 555 of the Xia *et al.* reference). This reference is listed on a Form PTO-1449 attached hereto. The Examiner is respectfully requested to consider the reference and make it of record in this application. A fee of \$180.00 is believed to be due with this submission and is being submitted with this Amendment. Such SAMs form spontaneously through chemisorption and self-organization of long-chained functionalized organic molecules on the surfaces of certain substrates. For example, alkaline thiol chemisorb spontaneously from a solution and onto a gold surface, thus forming highly ordered thiol-structures. Sulfur atoms which are bound to the gold surface of the carrier bring the alkyl chains in close contact to one another. Such ordered contact unavoidably leads to a highly ordered structure. As such, SAMs on gold surfaces are arranged as two-dimensional organic quasi-crystals.

In contrast to the arrangement taught by the Mirkin reference, however, charged polymers or plasma layers with charged reactive groups, as used in forming the presently claimed functional element (see, e.g., claim 1) form highly irregular amorphous structures.

Charged polymers (polyelectrolytes) form three-dimensional structures during deposition (i.e., physisorption). These polymer structures are multilayered, in contrast to SAMs which are, of course, monolayered. They are also highly irregular, again in contrast to SAMs (as taught in Mirkin), which have a regular, quasi-crystalline structure.

Similarly, plasmalayers (also recited in applicants' claim 1) form three-dimensional and highly unstructured amorphous multilayered structures. They are formed under radical conditions from one or more monomers present in the plasma gas.

As demonstrated in the discussion above, therefore, both the structure and the function of a functional element prepared in accordance with, e.g., applicants' amended claim 1 are entirely distinguishable from a corresponding element prepared according to the teachings of the Mirkin reference. Thus, since Mirkin does not disclose every feature of the element recited in claim 1, it does not anticipate applicants' claims. The Examiner is, thus, respectfully requested to reconsider and withdraw the rejection of that claim under §102(e). Furthermore, as the remaining rejected claims all depend, either directly or indirectly, from claim 1 those claims are all believed to be distinguishable for the same reasons as claim 1 and the §102(e) rejection of those claims should be withdrawn as well.

#### **Claim Rejections Under 35 U.S.C. §103**

Claims 8 and 9 are rejected under 35 U.S.C. §103 over Mirkin in view of U.S. Patent No. 6,093,302 of Montgomery et al. ("Montgomery") for the reasons given at p. 6 of the Office Action. This rejection is respectfully traversed.

Claims 8 and 9 depend from claim 1 and thus contain all of the recitations set forth in that claim. As claim 1 is believed to be distinguishable over Mirkin for the reasons presented above, claims 8-9 are believed to distinguish applicants' claimed functional element from that reference as well. As to the 'secondary' reference combined with Mirkin to reject applicants' claims 8 and 9 under §103, according to the Office Action, Mirkin fails to teach the bonding agent being a polymer with chemically reactive groups. Thus, the Montgomery reference has been combined with Mirkin due to a teaching contained therein (according to the Office Action) to use a bonding agent which is a thiol or a hydrogel polymer to attach molecules to a substrate to provide direct attachment of molecules to a substrate through a material that overlays the substrate.

Montgomery does not, however, refer to functional elements based on nanoparticles with addressable microstructures, as in the case of applicants' claimed functional element. Montgomery refers, instead, to electrochemically supported solid phase synthesis of DNA polymers. Other than the fact that in both the presently claimed functional element and in Montgomery a solid, structured support is used, the conditions and modes of operations of the

two systems (i.e., that claimed by applicants vs. that disclosed in Montgomery) are entirely different. The technical field which is the subject of the Montgomery reference is, thus, remote from that which is the subject of applicant's claims. Thus, one having ordinary skill in the field of art which applicants' disclosure falls within would not look to the field of the Montgomery reference, i.e., they would not be led toward combining Montgomery with Mirkin et al. to solve a problem encountered in such field.

Furthermore, as noted above applicants have amended their claim 1 such that it now recites that the inclusion of a bonding agent selected from a charged polymer or a plasma layer with charged chemically reactive groups. This feature of the claimed functional element is not even suggested by the Montgomery reference. Thus, the subject reference does not supply an important aspect of the claimed functional element that is missing from the disclosure of the Mirkin reference.

One of the major advantages of applicants' claimed functional element is its ability to bind biologically active molecules while preserving the full biological activity of these molecules once bound. This is of particular importance when proteins are bound. Advantageously, the biologically active molecules are bound in a directional manner. It was entirely unexpected that such directional binding could be obtained when unordered multilayered electrolyte layers, or plasma layers, are used as the bonding agent/layer. The concept of using charged polymers or plasma layers of charged reactive groups in structures or functional elements that bind biologically active molecules, in particular proteins, in a directional manner while preserving their biological activity had not been previously known before such was discovered by the present applicants and made the subject of the claims of this application. This is, moreover, apparent from the lack of disclosure concerning the indicated feature in either the Mirkin or the Montgomery reference.

For all of the reasons presented above, therefore, applicants submit that their claimed functional element would not be suggested to one having ordinary skill in this art over Mirkin and/or Montgomery, whether these two references are taken individually or in combination. The Examiner is, thus, respectfully requested to reconsider and withdraw the §103 rejection of applicants' claims 8-9 based on such combination of references.

Continuing onward, claim 18 is rejected at p. 7 of the Office Action under §103 over the combination of the Mirkin reference described above (hereinafter "Mirkin I") with a second

Mirkin reference, i.e., Mirkin et al. (US 2002/0132371), hereinafter referred to as “Mirkin II”. Mirkin I is cited for the reasons noted above. However, the Examiner states that Mirkin I fails to teach that the biologically active molecules are antibodies (as recited in present claim 18). The Examiner has thus combined Mirkin II with Mirkin I due to the disclosure in the former reference that (according to the Examiner) nucleic acids, antibodies and other specific protein-binding proteins may be used in a similar device [i.e., to that disclosed in Mirkin I] to provide for detection or [*sic*, of] protein analytes.

However, notwithstanding the above, applicants respectfully submit that neither Mirkin I or Mirkin II, taken individually or in combination, teach or even suggest to use a bonding agent selected from a charged polymer or a plasma layer with charged chemically reactive groups. Thus, as the subject references evince no recognition of incorporating the indicated feature (i.e., the specific bonding agent) of the presently claimed functional element, it is submitted that, *inter alia*, claim 1, which specifically recites this feature, and claim 18, which incorporates it by reference, are entirely distinguishable over the cited combination of references (Mirkin I and Mirkin II). The Examiner is, therefore, respectfully requested to reconsider and withdraw the rejection of claim 18 under §103.

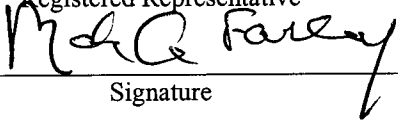
### **Summary**

The amendments and remarks presented herein are believed to overcome all of the Examiner’s grounds for rejection as set forth in the present Office Action. If the Examiner does not agree, however, and believes that an interview may advance the progress of this case, she is respectfully invited to telephone applicants’ representative at the number below so that such an interview may be arranged.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on : September 4, 2007

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Name of applicant, assignee or  
Registered Representative



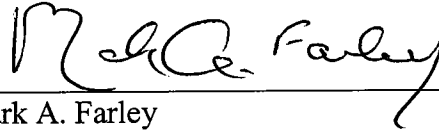
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September 4, 2007

Date of Signature

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Respectfully submitted,



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